Caroline Muller

CONTACT INFORMATION

Princeton University/GFDL
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RESEARCH EXPERIENCE

Princeton University/GFDL, Program in Atmospheric and Oceanic Sciences, Postdoctoral Research Associate

October 2010 - Present, with Isaac Held

- Investigate the sensitivity of the properties of convection in models

Massachusetts Institute of Technology, Dept. of Earth, Atmospheric, and Planetary Sciences, Postdoctoral Associate

September 2008 - September 2010, with Paul O'Gorman

- Investigate the response of the hydrological cycle to global warming, both in terms of mean precipitation and precipitation extremes
- Compare predictions with data from General Circulation Models (GCMs) of the IPCC Summary for Policymakers, and from a cloud resolving model

New York University, Courant Institute of Mathematical Sciences, Ph.D.

August 2003 - May 2008, with Oliver Bühler

- Studied the instability of internal waves generated by the interaction of tidal currents with deep-ocean topography
- Computed the vertical profile of wave-energy dissipation in the case of random topographies with statistics constrained by observations

NASA Goddard Institute for Space Studies

May 2006 - August 2006 and June 2004 - August 2004, with Vittorio Canuto and Armando Howard

- Studied a parametrization of the dissipation of tidal energy over rough topography in the ocean
- Implemented this parametrization in an ocean general circulation model in FORTRAN, and studied its impact on ocean circulation

NASA Goddard Institute for Space Studies

June 2005 - August 2005, with Vittorio Canuto

- Parameterized deep convection in the deep ocean

Georgia Institute of Technology, Aerospace Engineering Dept

August 2001 - December 2002, with Panagiotis Tsiotras

- Implemented a wavelet method for solving optimal control problems in MATLAB

Princeton University, Electrical Engineering Dept, Research Experience for Undergraduates

June 2000 - August 2000, with Stephen Forrest

- Performed experiments on electron transfer in Organic Light Emitting Devices
- Final presentation chosen for public display at `http://www.princeton.edu/~pccm/outreach/reuarchive/reuprojects2000.htm`

Honors and Awards

2007	Sandra Bleistein Prize for notable achievement in applied mathematics Courant Institute of Mathematical Sciences
2007	Best Poster Presentation Award AMS 16^{th} Conference on Atmospheric and Oceanic Fluid Dynamics
2007	Nominated for Outstanding Teaching Award New York University College of Arts and Sciences
2003–2008	Henry MacCracken Fellowship New York University Graduate School of Arts and Sciences
1999	Ranked first on the competitive entrance exam Mathematics major Supaéro, École Nationale Supérieure de l'Aéronautique et de l'Espace

Education

Courant Institute of Mathematical Sciences, New York University

Ph.D. in Applied Mathematics, May 2008

M.S. in Mathematics, May 2005

- Dissertation Topic: Wave-induced mixing in the abyssal ocean
- Advisor: Oliver Bühler

Georgia Institute of Technology

M.S. in Aerospace Engineering, Dec 2002 - exchange program with Supaéro

- Master's thesis topic: A wavelet method for solving optimal control problems
- Advisor: Panagiotis Tsiotras

Supaéro, École Nationale Supérieure de l'Aéronautique et de l'Espace, France

Engineering degree, March 2003

- Ranked first on the competitive entrance exam for Supaéro Mathematics major

Publications

C.J. Muller, P.A. O'Gorman, 2011, *An energetic perspective on the regional response of precipitation to climate change,* Nature Climate Change, **1**

C.J. Muller, P.A. O'Gorman, L.E. Back, 2011, *Intensification of precipitation extremes with warming in a cloud resolving model,* J. Climate, **24**

P.A. O'Gorman, C.J. Muller, 2010, *How closely do changes in surface and column water vapor follow Clausius-Clapeyron scaling in climate-change simulations?,* Environ. Res. Lett., **5**; see **ERL news article** about this paper at
`http://environmentalresearchweb.org/cws/article/news/42289`

V.M. Canuto, A.M. Howard, Y. Cheng, C.J. Muller, A. Leboissetier and S.R. Jayne, 2010, *Ocean turbulence III: New GISS vertical mixing scheme,* Ocean Modelling, **34**

C.J. Muller, L.E. Back, P.A. O'Gorman, and K.A. Emanuel, 2009, *A model for the relationship between tropical precipitation and column water vapor,* Geophys. Res. Lett., **36**; chosen to be an **Editor's Highlight**

C.J. Muller and O. Bühler, 2009, *Saturation of the internal tides and induced mixing in the abyssal ocean,* J. Phys. Oceanogr. **39**

C.J. Muller, 2008, *Wave-induced mixing above the abyssal seafloor,* Ph.D. Thesis, New York University

O. Bühler and C.J. Muller, 2007, *Instability and focusing of internal tides in the deep ocean,* J. Fluid Mech. **588**

Teaching Experience	Spring	2008	Lecturer, Calculus II
	Spring	2007	Lecturer, Calculus III
	Fall	2006	Lecturer, Calculus II
	Spring	2006	Lecturer, PreCalculus
	Fall	2005	Lecturer, Calculus II
	Spring	2005	Teaching Assistant, Quantitative Reasoning
	Fall	2004	Teaching Assistant, Quantitative Reasoning
	Fall	2003	Teaching Assistant, Business Calculus

Languages: Fluent in French (native) and English, basic German

Other Activities: Guitar, Climbing, WxChallenge with the MIT team (the North American collegiate weather forecasting competition)